



Effects of Storage on the Chemical Agent Resistance of Joint Service Lightweight Integrated Suit Technology (JSLIST)

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Agenda



- JSLIST Overview
- JSLIST Additional Source Qualification (JASQ)
- JSLIST Extended Storage Tests
- Environmental Conditioning Effects on JSLIST
- Conclusion



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Joint Service Lightweight Integrated Suit Technology (JSLIST)



- Lightweight chem/bio protective garment includes: two piece suit, overboots, and gloves.
- First fielded in 1997.
- Air permeable to reduce heat stress.
- Can be laundered up to 6 times and worn for 45 days during service life.
- Service life of 120 days out of package.
- Recent data suggests service life can be extended.



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JSLIST Additional Source Qualification Program (JASQ)



- JSLIST liner is made exclusively by a German company.
- Goal: Identify additional manufacturers of JSLIST which will then be used by the 5 current JSLIST cut and sew production facilities for follow-on JSLIST suit production.
- Testing initiated August 2001.
- JSLIST tested side-by-side other vendors.



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JASQ Test and Evaluation Phases



JASQ Test and Evaluation consisted of 4 Phases:

- Phase 1 (Aug-Sep 01) Environmental storage
- Phase 2 (Oct 01-Feb 02) Field Durability

Developmental Test (FDDT)

- Phase 3 (Mar 02) MIST & Aerosol Testing
- Phase 4 (Oct 02-Mar 03) Chemical Agent Swatch Testing



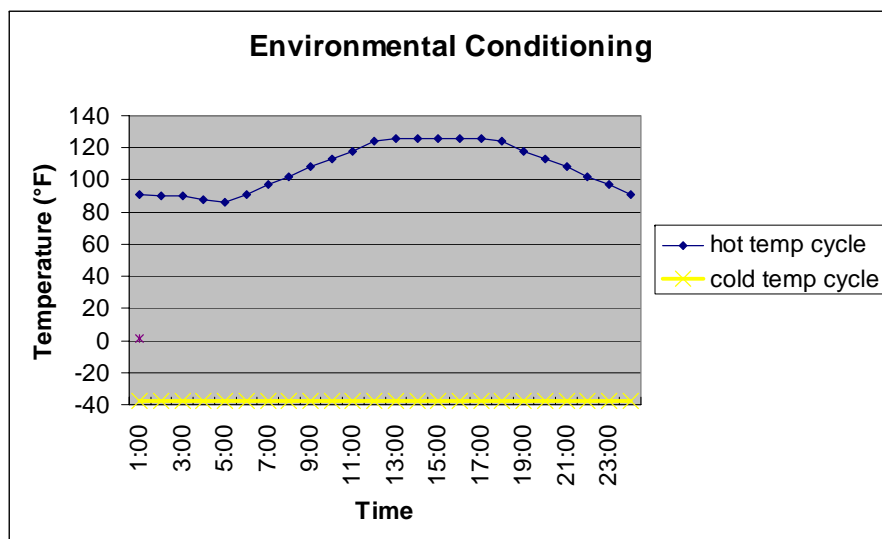
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JASQ Environmental Storage

Phase 1: Aug-Sep 2001



- 60 JSLIST suits undergo accelerated storage in vacuum packaging at Dugway:
 - 30 days in hot cycle storage (86-126 °F).
 - 30 days in cold storage (-38 °F).
- Packages remain unopened throughout 60 days.



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JASQ Field Durability Developmental Test

Phase 2: Oct 2001-Feb 2002



Suits with 60 days storage from Phase 1



- 300 Marines wear JASQ and JSLIST suits.
- 720 cumulative wear hours.
- 7th Marine Regiment performing 24- and 96- hour infantry training missions.
- 0 to 90°F, desert environment and solar load.

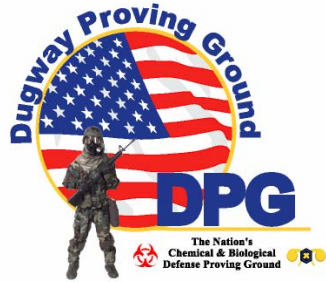


Phase 2 testing examined durability & comfort issues



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JASQ System Test and Evaluation

Phase 3: Mar 2002



- System Testing (MOPP 4 ensembles) in aerosol chamber at Research Triangle Inc., NC.

Worn garments from Phase 2 were used for MIST and Aerosol Testing



- System Testing (MOPP 4 ensembles) in vapor chamber at Dugway Proving Ground, UT.

Phase 3 testing examined chemical performance issues for system level tests (MOPP 4 ensembles)



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JASQ Swatch Test and Evaluation

Phase 4: Oct 2002-Mar 2003



Worn garments from phase 2 were used for chemical swatch and system testing



Chemical Tests:

- Worn JASQ Suits.
- 45 Days cumulative wear.
- Material swatch tests on new, worn and treated or environmentally conditioned materials with agents HD, GD and VX.



Phase 4 testing examined chemical performance issues for materials (swatch)



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JASQ Swatch Test and Evaluation

Phase 4 Cont.: Oct 2002-March 2003



- Worn JSLIST stored in sealed bags in controlled storage at Dugway from Oct 2002-April 2003.

- Baseline HD and GD wet sweat swatch testing at Dugway and Battelle HMRC in October 2002.

- Suits placed in controlled storage at Dugway from Oct 2002-April 2003.



- HD and GD wet sweat swatch testing repeated at Dugway and Battelle HMRC in April 2003.

- No statistically-significant difference ($\alpha = 0.05$) between the baseline materials and those stored for 6 months.

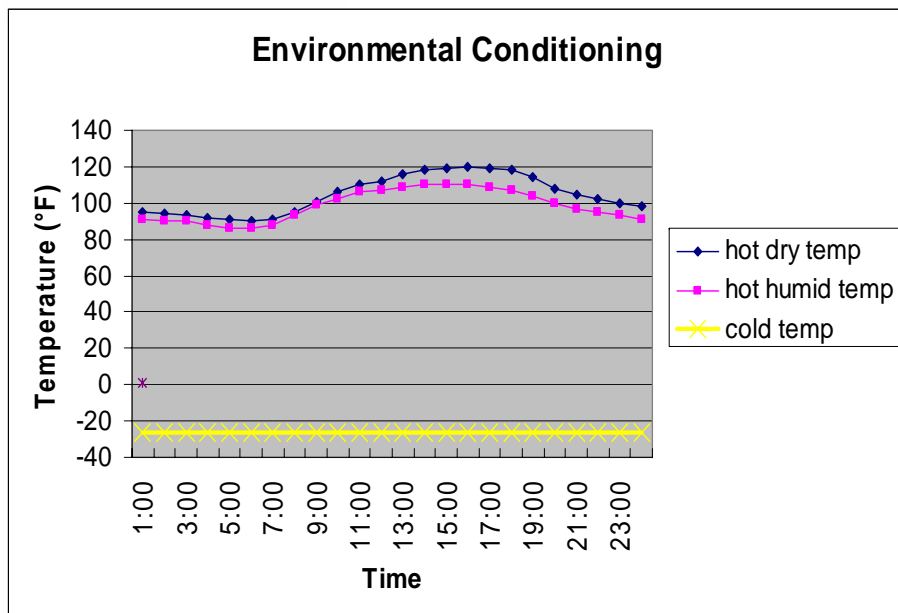
- Two-sample t-test using pooled variance used

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JASQ Swatch Test and Evaluation Environmental Conditioning Oct-Nov 2001



- New out of bag JSLIST stored separately:
 - Hot dry (90-120 °F) for 45 days in Dugway chamber.
 - Hot (86-110 °F), humid (up to 40% RH) for 45 days.
 - Cold (-26 °F) for 45 days.
- Daily flexing 7 times per week.
 - Unfold and Don.
 - Zip and unzip closures.
 - Doff and fold.
- After environmental conditioning complete, suits were placed in a sealed bag in controlled storage for 16 months.
- Swatch testing with HD and VX in March 2003 showed no degradation in chemical agent protection compared to new JSLIST.



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JSLIST Shelf Life Conclusions



- No degradation in chemical agent protection of JSLIST after:
 - 45 days of wear and between 8 and 14 months of controlled storage (60-75 °F, < 70% RH).
 - Out of package suits stored for 45 days between 90 and 120 °F at low humidity followed 16 months of controlled storage.
 - Out of package suits stored for 45 days at -26 °F followed by 16 months of controlled storage.
 - Out of package suits stored for 45 days between 86 and 110 °F at high humidity followed 16 months of controlled storage.



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